

SPECIFICATION AMENDMENTS

1. Please replace the paragraph beginning at line 20 page 2 with the following amended paragraph:

When multiple channels are available, ~~Automatic Link Establishment (ALE)~~ ALE is a communications technique based ~~one on~~ assigning an ALE adaptive controller the task of automatically controlling a high frequency (HF) receiver and transmitter in order to determine and establish the highest quality communications link with one or more HF radio stations. ALE automates the process of searching channels to find one that offers the optimum signal quality. In the majority of existing ALE HF systems, the participants in a communication net or link are assigned a common set of frequencies, ~~and the~~ The role of the automated

2. Please replace the paragraph beginning at line 3 page 3 with the following amended paragraph:

In asynchronous ALE systems, radio receivers at different ends of the HF link scan round the common set of frequencies, stopping on each for a set period of time to determine if a link request is being made on that frequency. The different radios have no common knowledge of time, and hence scan round the frequency group asynchronously. When the ALE system wants to set up a link to another user, it selects a frequency from the predefined set and transmits a known calling sequence on that frequency to request a response from the intended destination. Due to the asynchronous nature of these systems, the transmission time for the call request needs to be long enough to ensure that the called station has sufficient time to scan round all the frequencies in the scan group. The calling station therefore transmits the calling sequence for a sufficiently long period and then, if a response is heard on the called frequency, it is assumed that the link is established. If no response is heard, ~~then~~ the calling station chooses another frequency from the frequency group and continues with a new calling sequence until a frequency is found ~~which~~ that can be used for link set up.

3. Please replace the paragraph beginning at line 7 page 4 with the following amended paragraph:

Although ALE is a powerful communications technique, it suffers from high signal overhead, which reduces information throughput. Signal acquisition time, including modem training intervals, ~~may both~~ contributes to an inordinate amount of time spent setting up a communication channel for transmission of desired information. Most ALE systems use non-coherent rather than coherent modulation techniques, because of synchronization difficulties and the fact that coherent synchronization requires both frequency and phase synchronization.

4. Please replace the paragraph beginning at line 2 page 5 with the following amended paragraph:

The invention provides a system and method for synchronized communication of information between stations. The system and method operate to eliminate the modem training interval after establishing a selected communications channel between modems attached to the stations. Coherent modulation, along with the use of ALE protocols (selecting channels based on link quality analysis) provides high speed, reliable communications without the expense of internal synchronization circuitry. External frequency references can be derived from Global Positioning System (GPS) signals, double sideband residual carrier signals, 60 KiloHertz carrier frequency signals broadcast by radio stations, or amplitude modulated (AM) broadcast signals, such as those provided by AM radio stations.

5. Please replace the paragraph beginning at line 25 page 5 with the following amended paragraph:

The system of the invention includes a first station having a first modem, a second station having a second modem, and a means for establishing the selected communications channel between the modems. ~~Again, the~~ The information is communicated between the

modems using coherent modulation synchronized by an external frequency reference without using a training interval. The system

6. Please replace the paragraph beginning at line 2 page 8 with the following amended paragraph:

As indicated in the Background, although ALE is a powerful communications technique, it suffers from high signal overhead, which reduces its overall ability to rapidly transmit information. As mentioned previously, the (typically) high frequency propagation media can heavily distort the signal and cause frequent loss of signal. Thus, the advantageous mechanism of coherent demodulation is seldom used. As a solution to this problem, among the others mentioned above, coherent modulation, external frequency references, and ALE communication can be combined to increase data throughput, eliminate the modem training interval, and reduce the bandwidth required for acquiring a particular signal. SNR would also be improved at station phase-locked loop (PLL) and data detectors, since the noise bandwidth is reduced to a reduction in center frequency error. Thus, sounding times can be reduced, and higher levels of modulation can be implemented, along with narrower bandwidths, to provide equivalent data throughput. Also, narrower bandwidths are less susceptible to propagation distortion.

7. Please replace the paragraph beginning at line 23 page 8 with the following amended paragraph:

FIGURE 1 is a block diagram of the system of the present invention 100. The stations 10, 20 each ~~gave~~ have a transmitter and a receiver, a receiver and a transmitter, or a pair of transceivers, respectively. The stations 10,20 each have external synchronization circuitry 30, 40, respectively.

8. Please replace the paragraph beginning at line 29 page 8 with the following amended paragraph:

Station 10 is in electronic communication 110 via integral construction (or hardwire/wireless/optical communication) with modem~~1~~ 50. Similarly, station~~2~~ 20 is in electronic communication 120 with modem~~2~~ 60. The modems 50, 60 are in communication with each other over an established communications channel 70. It should be noted that the communication channel 70 may be hardwired, wireless, or optical fiber. Any means of transmitting information between the stations 10, 20, and more particularly, between modems 50, 60, may be used. Thus, the channel may ~~also~~ be a physical channel (i.e., hardwired), or a virtual channel (i.e., packets sent over a global telecommunications network, such as the Internet).

9. Please replace the paragraph beginning at line 12 page 9 with the following amended paragraph:

The external reference signal 90 may be provided by one of several sources. For example, the Global Positioning System (GPS) provides ~~both~~ a highly accurate time and frequency reference, available to most points on the earth. Alternatively, broadcasts from the National Institute of Standards and Technology (~~NIST~~NIST) radio station WWVB, located near Fort Collins, Colorado, ~~broadcasts~~ can ~~also~~ be used. ~~The transmissions~~ Transmissions from WWVB are used by millions of people throughout the United States to synchronize consumer electronic products, such as wall clocks, clock radios, and wristwatches. The WWVB signal is also widely used for network time synchronization, and frequency calibration. The WWVB broadcast is continuous, at a frequency of 60 kHz. There is also a 60 kHz carrier frequency which can be used as an accurate frequency standard, referenced to the NIST Frequency Standard.

10. Please replace the paragraph beginning at line 3 page 10 with the following amended paragraph:

Thus, a standard reference signal, such as that provided by the GPS or WWVB systems, along with an ALE controller (such as the ALE controllers 130, 140 shown in Figure 1 and in electronic communication with the stations 10, 20, respectively), can be used to produce carrier signals for time synchronization of transmitted data. At a remote receiver site, for example station 220, the same reference signal 90 can be used to establish the center frequency of the receiver, synchronize the data in time, and produce a carrier for coherent detection of the received signal.

11. Please replace the paragraph beginning at line 14 page 10 with the following amended paragraph:

Specialized GPS time and frequency reference receivers, such as the Hewlett Packard model 58503B₂, produce time and frequency signals by detecting and processing the GPS direct sequence spread spectrum signal. This is a viable method when the cost of the referenced receivers can be accommodated by the operators of stations 10, 20. However, when another signal common to the station 10, 20 sites is used as a reference (typically not intended to be used as a time and frequency reference signal), special processing may be necessary to remove modulation and noise from the signal, as is well known to those skilled in the art. Thus, DSB-RC signals not intended as time and frequency references, such as those provided by AM broadcast stations, NTSC television stations, etc., can be used to produce a frequency reference at frequencies other than their carrier frequency. This is easily accomplished by filtering and using a PLL to lock the resulting signal to